GENE NEWS

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Newborn Screening for Cystic Fibrosis starts September 2007!

After considerable research and discussion, the State Newborn Metabolic Screening (NBMS) Advisory Committee accepted the Hawai'i Cystic Fibrosis (CF) Task Force recommendation that CF be added to the NBS panel. Starting September 2007, Hawai'i will be screening its newborns for 32 genetic and metabolic disorders and hearing loss!

Welcome to the Fall issue of GeneNews.

Can you believe that it has been over a decade since our state began expanding the newborn screening panel from just two disorders? This issue of GeneNews highlights the important information that you need to know about the addition of Cystic Fibrosis to our newborn screening panel. Additional information can always be found on our website at ***www.hawaiigenetics.org***.

Besides improving the state's NBS, we continue our efforts to increase access and sustain genetic services for families on the neighbor islands. As part of the Health Resources and Services Administration (HRSA) funded Western States Genetic Services Collaborative Practice Model activities, face-to-face outreach clinics and telemedicine services are now available on Kauai, Molokai, Maui, and the Big Island (Hilo, Kona, and Waimea). Not surprisingly, many of the families report that their child would not have been able to receive a genetics consultation without the aid of the outreach and telemedicine clinics. The good news is that we just received a five year continuation of the federal funding for this project to continue the Practice Model and other activities to demonstrate the benefits of regional collaboration for genetic services and education.

The Genetics Program also recently was awarded a three year HRSA grant to develop evidence-based educational materials for parents who receive false positive newborn screening results. We will be working with parents in Hawai'i, California, Oregon, Washington, Idaho and Alaska to ensure that the materials are culturally appropriate and meet the needs of the parents and their primary care providers when a newborn receives a false positive result.

Finally, we want to thank everyone for your continued support to help improve genetic and newborn screening services for the families in Hawai'i. We are successful because of the support you give us.

As always, please contact me if you have any questions or comments. I look forward to hearing from you.

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"What is Cystic Fibrosis (CF)?"

Cystic Fibrosis is a common inherited condition that mainly affects the lungs and digestive system.

How common is CF?

- CF occurs in about 1/4000 children born in the United States.
- CF can affect people of all ethnic backgrounds.
- CF is most common in Caucasians (1/3200 live births).

Why does CF occur?

- CF is the result of a gene mutation inherited from both parents. Typically, a person who has CF has two gene mutations, one from each parent.
- Parents who are carriers of the gene mutation will have one gene mutation. Carriers are usually healthy and do not show any signs or symptoms of the disease.
- If both parents are carriers, each of their children has a 25% chance of having CF. Both boys and girls are affected equally.

What are the symptoms of CF?

- The gene mutation causes the body to make mucus that is unusually thick and sticky.
- The mucus can promotes frequent infections in the lungs along with constant coughing or wheezing.
- The thick mucus can also block the normal function of the pancreas so that food can not be broken down and absorbed by the body.
- Intestinal problems such as diarrhea, constipation, and pain can result.
- Even though people with CF may have a good appetite, they can have poor weight gain due to their digestive tract problems.
- The person's sweat may be salty. A doctor may order a "sweat test" to determine if CF is the correct diagnosis.

Is there treatment for CF?

- While there is no cure for CF, there are treatments for some of the symptoms, including antibiotics for infection, physical therapy, nutritional therapy and lung transplants.
- More people with CF are living into their forties and beyond.
- Many people with CF lead fulfilling lives pursuing college degrees and having families of their own.

What a Pediatric Care Provider Needs to Know.....

- Cystic Fibrosis (CF) is being added to the state newborn screening (NBS) panel with a target date of September 1, 2007.
- NBS for CF is a screening test. **DO NOT** base a diagnosis of CF on one or two positive NBS results. Diagnosis of CF needs to be confirmed with additional diagnostic tests and genetic evaluation. The Hawai`i Newborn Screening Program will assist you with the coordination and costs of the follow-up to confirm a diagnosis of CF in the newborn.
- Health care providers should not begin medical intervention for CF until confirmatory testing is completed. About one-third of children with positive screening results are confirmed to have CF.
- Families and infants diagnosed with CF should receive genetic evaluation and counseling by genetics specialists and ongoing care provided by a pediatric pulmonologist and gastroenterologist.
- **NBS does not detect all cases of CF in newborns**. Up to 5% of CF cases may not be detected, so all symptomatic children for CF should receive evaluation regardless of their NBS test result.

What a Prenatal Care Provider Needs to Know.....

- In 2001, the American College of Obstetricians and Gynecologists (ACOG) began recommending that DNA screening for CF should be made available to all couples seeking preconception or prenatal care, not just those with a personal or family history of carrying the CF gene. Newborn screening for CF does not alter these ACOG recommendations.
- NBS only detects infants with CF caused by two gene mutations. It does not detect unaffected infants who have one gene mutation for CF (i.e. carriers).
- Prenatal care providers should briefly educate expectant parents about NBS and inform them that CF has been added to the NBS panel.
- Remember that NBS is a screening test. It will not detect all cases of CF in newborns and can miss up to 5% of cases.
- An education brochure is available to help you explain newborn screening to your patients. Please contact the NBS program if you want these brochures.

Questions regarding NBS for CF or any other NBS questions can be directed to:
Newborn Metabolic Screening Program Coordinator,
Christine Matsumoto, R.N.,M.P.H., at (808) 733-9069

4 "Let Them Be Healthy:

Initially, the Peters* seem like your everyday family. Mary* and John* are the parents of Kelly*, 19; Josh*, 15; and Emily*, 13. The Peters kids keep themselves busy with activities including music, dance, and bicycling. However, on top of normal day-to-day activities, the Peters also include what can add up to over 3 hours of lung treatments into their day. Words like enzymes, "nebbies", pulmozyme, and vest machine are used regularly in the household and nebulizers are washed frequently. The Peters are a family living with Cystic Fibrosis (CF). Kelly was diagnosed at 7 months of age after a grueling search for a diagnosis. Six years later, with the knowledge of CF in the family, Emily was diagnosed at birth. Their brother, Josh, was found not to have CF.

During Kelly's early months, she began showing signs of a rash and failure to thrive. Although she was not gaining weight, she appeared chubby due to the puffiness of her skin. By the time she was 6 months of age, the doctors knew there were problems since she appeared more like a 4 month old. At this time, a range of tests were performed in search of an answer. These ranged from X-rays and skin biopsies to blood tests. Despite all the testing, the family was not finding an answer and Kelly continued to get worse.

Finally, the family was given a possible diagnosis of CF when they met with their gastroenterologist. Although it took a while for the final diagnostic tests to confirm CF, treatments were started since Kelly was symptomatic.

Mary described the feelings of relief as they finally watched the symptoms disappear for the first time and knowing that the medicine Kelly was given was working. At last, they had an answer. Mary explains that finally receiving the diagnosis of CF was much more bearable than the period of time when Kelly did not have a diagnosis.

Emily's course was a little different. Although the family chose not to find out prior to her birth, Emily was diagnosed as a newborn. She was born with meconium ileus, a blockage of the intestine that occurs in approximately 15-20% of newborns with CF. Because of the family's knowledge of CF, the diagnosis was made quickly. A surgery was required to fix her intestine and Emily spent her first month of life in the hospital. Those days were not without their challenges, yet Mary described the second time around in dealing with the diagnosis and addressing the medical issues associated with the CF, as being easier because they knew right away. They began treatments immediately and started chest physical therapy as soon as Emily arrived home.

For more information on CF, please visit:
http://www.newbornscreening.info/Parents/otherdisorders/CF.htm

A Parent's Perspective"

These trials, along with her experience as a mother of two children with CF, led Mary to become involved with the Hawai'i CF Task Force, a coalition looking at adding CF to the newborn screening panel in Hawai'i. She felt this was an important issue and that it was her duty as a parent and a community member to become involved. Her perspective as a parent is that the sooner CF is identified, the better. When asked her feelings upon hearing that CF was being included in the panel, Mary said, "I was really happy because I felt the possibility of CF being detected in babies earlier was really important." Mary has experienced first hand what it is like not having an answer at birth about her baby and what it is like when you do. She knows the worry that goes along with having a sick child and not knowing why. She also recognizes the medical benefits of early diagnosis and early treatment. For these reasons, she supports the screening of newborns for CF.

Since the diagnosis, Mary and John have dedicated themselves to maintaining both the health of their children and their overall well-being. CF has now been a part of their lifestyle for nearly 19 years. When asked about advice she would give a new parent, Mary had some practical tips, "Prepare for your appointments and have questions ready. Have a list of things to cover."

Mary also feels that sleep, never missing treatments, and watching out for signs of potential infection have been crucial in maintaining the health of her daughters. But some of the most powerful advice that Mary gave was more philosophical, "Be positive. Enjoy your baby and don't think of it as a disability. CF is not who your child is. Don't let CF control your life."

The Peters do not ignore CF in their lives. They are aware of the severity of the condition and know how devastating it can be. Yet, they also recognize the variability of the condition. The Peters kids have been raised in a positive and hopeful environment, which likely attributes to their great success. They have been taught that they are their own person and to not let the disease define them. Their story is one that is inspirational and exceeds the limits of this article. There is much to learn from the Peters family, but Mary summed it best in her statement, "Let them be healthy". A philosophy that the Peters seem to be living by very well.

*Names have been changed to protect the privacy of the family

Newborn Screening Program Update

Newborn Metabolic Screening Statistics

The Hawai'i Newborn Metabolic Screening Program currently screens infants for 31 genetic or metabolic disorders. NBS for phenylketonuria and congenital hypothyroidism has been done since the 1960s. Five additional disorders: congenital adrenal hyperplasia, maple syrup urine disease, galactosemia, biotinidase deficiency, and the hemoglobinopathies have been included on the newborn metabolic screening panel since 1997. The remaining 24 conditions were added to the panel in 2003.

Hawai'i Newborn Metabolic Screening Disorders

Endocrine Disorders
- Congenital adrenal hyperplasia (CAH)
- Congenital hypothyroidism

Hemoglobin Disorders
- Hemoglobinopathies

Metabolic Disorders
- Biotinidase deficiency
- Galactosemia

Amino Acid Disorders
- Arginase deficiency
- Argininosuccinate lyase deficiency (ASA)
- Citrullinemia
- Homocystinuria
- Hyperphenylalanemia, including phenylketonuria (PKU)
- Tyrosinemia

Fatty Acid Oxidation Disorders
- Carnitine uptake/transport defects
- Multiple acyl-CoA dehydrogenase deficiency (MADD)
- Short chain acyl-CoA dehydrogenase deficiency (SCADD)
- Medium chain acyl-CoA dehydrogenase deficiency (MCADD)
- Long chain 3-hydroxyacyl-CoA dehydrogenase deficiency (LCHADD)
- Very long chain acyl-CoA dehydrogenase deficiency (VLCADD)

Organic Acid Disorders
- Beta-ketothiolase deficiency
- Glutaric acidemia, type 1
- Isobutyryl CoA dehydrogenase deficiency
- Isovaleric acidemia (IVA)
- Malonic aciduria
- Maple syrup urine disease
- Maple syrup urine disease (MSUD)
- Maple syrup urine disease (MSUD)
- Methylmalonic acidemias (8 types)
- Propionic acidemia
- 3-Hydroxy-3-methylglutaryl (HMG) CoA lyase deficiency
- 2-Methyl-3-hydroxybutyryl CoA dehydrogenase deficiency
- 2-Methylbutyryl CoA dehydrogenase deficiency
- 3-Methylcrotonyl CoA carboxylase deficiency (3MCC)
- 3-Methylglutaconyl CoA hydratase deficiency
- Multiple carboxylase deficiency

To be added in September 2007
- Cystic fibrosis

The table below shows the number of newborns in Hawai'i confirmed with disorders in the newborn screening panel. A comparison with the U.S. incidence of the disorder is also provided. The remaining 18 conditions missing from the table have not yet been detected in Hawai'i by the newborn screening program and have not been diagnosed in any children born in the state to our knowledge.

Disorder	U.S. Incidence	Hawai'i Incidence	Diagnosed Cases
Phenylketonuria	1/18,000	1/59,341	2 classic PKU 1hyperphe PKU
Congenital Hypothyroidism	1/4,000	1/2,507	71 primary hypothyroidism 3 hypopituitary hypothyroidism 1 compensated hypothyroidism 1 undetermined 18 transient hypothyrodism
Congenital Adrenal Hyperplasia	1/15,000	1/29,671	3 salt wasters 3 virilized
Maple Syrup Urine Disease	1/250,000	1/35,605	4 classical MSUD 1 intermediate MSUD
Galactosemia	1/60,000	1/89,012	2 classical galactosemia 14 Duarte Variant 1 LAD 6 DD or LAG
Biotinidase Deficiency	1/70,000	1/44,506	2 profound deficiency 2 partial biotinidase deficiency
Hemoglobinopathies	1/15,000	1/35,605	3 SC Disease and 2 SS Disease 9 probable Hb E Disease 171 possible Hb H Disease 1 Hb C 1 Hb C and E 1 New York Variant 1 Hb Lepore
MCADD	1/15,000	1/23,646	3 cases (2 infants passed away at day 3)
VLCADD	1/120,000	1/70,939	1 case
3MCC	1/50,000	1/35,470	2 cases
Holocarboxylase Synthetase Deficiency	1/87,000	1/70,939	1 case
CPT-1 Variant	Unknown	1/11,823	6 cases
IVA	1/230,000	1/70,939	1 case
Permanent Congenital Hearing Loss *	3/1,000	3.4/1,000	424 cases

* from January 1, 2000 – December 31, 2006

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Just the Facts

If you would like to learn more about cystic fibrosis or any of the other newborn metabolic screening conditions mentioned in this GeneNews issue, visit ***www.newbornscreening.info*** and click on

You will find fact sheets for the different newborn screening disorders, including cystic fibrosis.

These fact sheets were originally developed as a cooperative effort of newborn screening programs, genetics professionals, families, health educators, dieticians, and primary care providers in the western states with funding from the Health Resources and Services Administration. Annual review of the fact sheets is done by metabolic specialists from around the country. Each fact sheet contains general information about the symptoms, inheritance, and management of the condition, and provides links to other websites where more information can be found. The fact sheets are written at a 6-7th grade level so they are ideal for parents who want more information.

For more specific questions about the implementation of cystic fibrosis screening in Hawai'i , contact

Christine Matsumoto, RN, MPH
Hawai'i Newborn Metabolic Screening Coordinator,
at 808-733-9069.